

## ABSTRACT

A method of surface modification in fabricating High Temperature Superconducting devices, characterized in that bombarding the preformed material surface with a particle beam having energy, to improve the smoothness of the material surface and change the microstructure or internal defects of the processed material, wherein the energy of the particle beam is in the range of 5ev to 50000ev, and the incidence angle is in the range of 5 degree to 85 degree. In some cases, in order to achieve the desired superconductivity, the bombarded sample is annealed, and the annealing temperature is in the range of 100°C to 1500°C. The present invention can improve the surface smoothness of the processed material, reduce the surface defect, change the microstructure of the material, and thereby improve the superconductivity of the whole device. The bombarded material comprises a substrate, a transition layer, superconducting layer or any combination of them during the process of the fabrication of the superconducting devices.